# Incentives and Contract Frames: Comment

ISSN 1936-5349 (print)
ISSN 1936-5357 (online)

# HARVARD

JOHN M. OLIN CENTER FOR LAW, ECONOMICS, AND BUSINESS

## INCENTIVES AND CONTRACT FRAMES
## COMMENT

Claudia M. Landeo
Kathryn E. Spier

Discussion Paper No. 719

07/2012

Harvard Law School
Cambridge, MA 02138

JEL Classes: C91, D03, D86

# Incentives and Contract Frames Comment

**Claudia M. Landeo and Kathryn E. Spier***

*Abstract*

Principal-agent problems are pervasive in economic settings. CEOs and shareholders, lawyers and clients, manufacturers and retailers, lenders and borrowers are all examples of settings in which moral hazard problems might arise. Incentive contracts in both individual and team environments have been studied by economists (see Shavell (1979) and Holmstrom (1982, 1979) for seminal theoretical work, and Prendergast (1999) for a survey of empirical literature). Contracts that tie an agent's compensation to performance, such as conditional bonus schemes, have been proposed as a way to align the interests of agents and principals. Experimental literature from economics and social psychology suggests that the way choices are framed can affect decisions as well. Hence, contract frames might influence the effectiveness of incentive schemes. This comment first outlines seminal experimental work on frames and describes a recent study that relates the incentive contract literature with the experimental work on frames. Second, it discusses the experimental design and findings of Brooks, Stremitzer, and Tontrup's (2011) work on individual incentives and contract frames.

*Journal of Institutional and Theoretical Economics*, 168, 2012, pp. 83-88.

* University of Alberta Economics Department and Yale Law School, and Harvard Law School.
Claudia Landeo acknowledges financial support from Northwestern University School of Law and the University of Alberta, and the hospitality of the Harvard Law School and Northwestern University School of Law. Kathryn Spier acknowledges financial support from the Harvard Law School. We thank Rick Brooks, Alex Stremitzer, and Stephan Tontrup for sharing their data set and experiment instructions with us. We are grateful for comments from conference participants at the 2011 Max Planck Institute-University of Bonn Seminar on Testing Contracts. The usual qualifier applies.

# Incentives and Contract Frames
# Comment

Claudia M. Landeo and Kathryn E. Spier



## 1 Introduction

Principal-agent problems are pervasive in economic settings. CEOs and shareholders, lawyers and clients, manufacturers and retailers, lenders and borrowers are all examples of settings in which moral hazard problems might arise. Incentive contracts in both individual and team environments have been studied by economists (see Shavell [1979] and Holmstrom [1982, 1979] for seminal theoretical work, and Prendergast [1999] for a survey of empirical literature). Contracts that tie an agent's compensation to performance, such as conditional bonus schemes, have been proposed as a way to align the interests of agents and principals. Experimental literature from economics and social psychology suggests that the way choices are framed can affect decisions as well. Hence, contract frames might influence the effectiveness of incentive schemes.

This comment is organized as follows. Section 2 outlines seminal experimental work on frames and discusses a recent study that relates the incentive contract literature with the experimental work on frames. Section 3 discusses the experimental design and findings of Brooks, Stremitzer, and Tontrup's [2011] work on individual incentives and contract frames. Section 4 presents concluding remarks.

## 2 Relevant Literature

Tversky and Kahneman's [1991] work on individual choice explores the psychological differences between gains and losses. Their findings suggest that people dislike losses more than they like equal-sized gains, a phenomenon called loss-aversion. As a result, the way choices are framed (or mentally accounted for) can affect the decisions people make. Cachon and Camerer [1996] extend Tversky and Kahneman's [1991] work on framing to strategic decision-making environments with multiple players. Specifically, they study the effect of framing in coordination games with Pareto-ranked equilibria, and propose a new selection principle called

loss-avoidance. This selection principle implies that players will not choose (or expect others to choose) strategies that result in certain losses if other (equilibrium) strategies are available. Cachon and Camerer [1996] find that charging a fee to play, which renders inefficient equilibria money-losing, induces coordination on Pareto-superior equilibria. These results suggest the use of loss-avoidance as selection principle. The authors conclude that mental accounting of outcomes affects choices in strategic settings by guiding players' beliefs about the behavior of others.

More recently, Hossain and List's [2009] work combines the economics literature on incentives with the findings on framing. Using a natural field experiment,[1] they study the effects of contract frames on worker productivity in both individual and team settings. Their findings suggest that pay-for-performance compensation schemes (conditional bonuses) framed as both losses and gains increase productivity for both individuals and teams (compared to fixed-salary schemes). Note that the observed increase in productivity under pay-for-performance schemes reflects rational behavior of individuals and team members (because higher productivity is associated with higher monetary payoffs). In addition, their findings indicate that *teams* exhibit stronger responses to bonuses presented as losses than comparable bonuses presented as gains, suggesting loss-aversion considerations. Interestingly, the differences in productivity for the team treatments are statistically significant and robust to various controls, whereas *the individual differences are less robust* (not statistically significant). The authors argue that the stronger frame effects among teams might reflect the concern of team members about letting fellow team members down, and the influence that highly loss-averse workers (who are more vigilant about the performance of their team members) might have on other team members.

# 3 Individual Incentives and Contract Frames: Brooks, Stremitzer, and Tontrup [2011]

Brooks, Stremitzer, and Tontrup [2011] experimentally assess the effects of contract frames on individual performance, using a between-subject design.[2] The basic experimental conditions are as follows: a Gain Frame condition (where a bonus is paid at the end of the game if a specific target is met or exceeded) and a Loss Frame condition (where a bonus is temporarily transferred and deducted at the end of the game if the target is not met). Two additional conditions are explored: a

[1] A natural field experiment is "one where the subjects naturally undertake [the] tasks and where the subjects do not know that they are in an experiment" (Harrison and List [2004], p. 1014).

[2] The authors motivate their paper on Hossain and List's [2009] work. Given that Hossain and List's [2009] findings do not suggest significant effects of contract frames on individual performance, it is not clear why individual performance was selected.

*Table 1*
BROOKS ET AL.'s [2011] Numerical Example

| Information Provided[1] | | Information Not Provided[2] | |
|---|---|---|---|
| Machine | Bonus | Experiment Payoff[3] | Monetary Payoff |
| 1 | NO | 9000 | 18.0 |
| 2 | NO | 8000 | 16.0 |
| 3 | YES | 8700 | 17.4 |
| 4 | YES | 7500 | 15.0 |
| 5 | YES | 6500 | 13.0 |
| 6 | YES | 5500 | 11.0 |

*Note*: [1]The information provided also included the output level and rental cost per machine; [2]experiment payoff and monetary payoff needed to be computed by the subjects; [3]the experiment currency was the *Experiment Franc* (500 Experiment Francs = 1 Swiss Franc).

Loss Expectations condition[3] and a Loss Endowment condition.[4]

At the beginning of the experimental session, the subjects are informed about the performance (output level) and rental cost of six different machines, whether each output level is associated with a bonus (or just a fixed payment), and the monetary value of the bonus and fixed payment. Note that the subjects are not explicitly provided with the payoffs associated with the different machines. However, the subjects do have sufficient information to calculate these payoffs. Subjects are then asked to choose a specific machine.

Table 1 summarizes the numerical example used in this study. Two points deserve a discussion. First, the agent's monetary payoff is maximized by choosing the least productive machine, machine 1. Hence, this choice corresponds to the theoretical point prediction. Second, although the objective of the principal is not theoretically discussed in the paper, we might infer from this numerical example that the principal's objective is to induce a level of output that corresponds to the choice of machine 3 (or higher). This is reflected by the lower bound for the bonus provision in the numerical example. Then, the economic objectives of the principal and the agent are not aligned under this pay-for-performance scheme. As a result,

[3]Under this condition, a bonus is temporarily transferred *but* subjects are informed that this transfer responds to a tax purposes only. The bonus is deducted at the end of the game if the target is not met.

[4]Under this condition, a payment is temporarily transferred and deducted at the end of the game if the target is not met. Note that the *payment* label is used instead of the *bonus* label.

*Table 2*
BROOKS ET AL.'s [2011] Findings

| Condition | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| Gain Frame | 51 | 3 | 16 | 1 | 1 | 0 |
| Loss Frame | 46 | 0 | 18 | 9 | 0 | 0 |
| Loss Expectations | 41 | 0 | 15 | 1 | 0 | 1 |
| Loss Endowment | 46 | 0 | 11 | 2 | 1 | 1 |

the rationale for this experimental environment is not clear.[5]

Next, we discuss the *fundamental* hypotheses explored in BROOKS ET AL. [2011].[6] First, the authors hypothesize the deviation from the point prediction (i.e., the choice of a machine different from machine 1), across conditions.[7] Second, the authors hypothesize that this deviation from the point prediction will be significantly stronger under the loss frame (compared to the gain frame).[8] The rationale for these hypotheses is not clearly defined. The paper does not establish a relationship between these hypotheses and prior theoretical and experimental literature. Consider the first hypothesis. The choice of a machine different from machine 1 represents a non-rational choice. It is unclear why, in theory, a subject would make such a choice (see our discussion of the numerical example). Consider now the second hypothesis. The authors also fail to explain why the loss frame would be more likely to induce more non-rational behavior than the gain frame.

Table 2 summarizes the findings from this study. These findings provide support for the theoretical point prediction (the choice of machine 1). In fact, the mode choice (across conditions) is machine 1: 71, 63, 71, and 75% of subjects chose machine 1, in the Gain Frame, Loss Frame, Loss Expectations and Loss Endowment conditions, respectively. A few comments regarding the findings and experimental

[5]Although we have no objection to an experimental environment that abstracts from the presence of the principal, we do believe that an experimental study regarding pay-for-performance incentive schemes should involve a theoretical discussion of the objective of the principal and an alignment of the numerical examination with this theoretical framework.

[6]Although BROOKS ET AL. [2011] explore other elements related to the loss frame (Loss Expectations and Loss Endowment conditions), these additional elements are relevant only in case of significant differences between the gain and loss frames. Hence, we decided to focus our discussion on the two basic contract frame conditions.

[7]In their June 2011 version of the manuscript, the authors state that"although subjects maximize their payoffs when choosing machine 1, they would sometimes lease other machines yielding higher output and earning them a bonus" (BROOKS ET AL. [2011], p. 9).

[8]In their June 2011 version of the manuscript, the authors indicate that "the tendency to lease higher output machines is stronger in the loss frame than in the gain frame" (BROOKS ET AL. [2011], p. 10).

design follow. First, the practice exercise, administered before the actual elicitation of choices, explicitly directed the attention of the subjects to machine 1.[9] Then, the mode choice of machine 1 might indicate that the experimental design induced specific behavior. Second, the payoffs from choosing machines 1 and 3 are equal to 9000 and 8700, respectively (18 and 17.4 Swiss Francs). The similarity between these two payoffs might explain the frequency of choice of machine 3. Third, given that the payoffs were not provided to the subjects (participants needed to compute the payoffs from the information provided), the choices of machines different from machine 1 might suggest computational errors. Finally, these findings do not support the authors claim regarding the replication of Hossain and List's [2009] results. Although these findings do not contradict Hossain and List [2009], they *do not* confirm Hossain and List [2009] either.[10]

# 4 Concluding Remarks

Experimental work from economics and social psychology suggests that framing manipulations can influence individual choice and decisions in strategic settings. Hence, contract frames might affect the effectiveness of incentives schemes. Hossain and List's [2009] findings suggest a stronger effect of contract frames on group decision-making (compared to individual decision-making). Experimental investigation of the factors that might influence the effects of contract frames on group decision-making in strategic settings[11] might complement Hossein and List's [2009] field experiment. These, and other extensions, remain fruitful areas for future research.

# References

Brooks, R., Stremitzer, A., and Tontrup, S. [2011], "Framing Contracts: Testing 'Effort' under Gain and Loss Frames," mimeo, Max Planck-University of Bonn Seminar on Testing Contracts, Krakow.

Cachon, G.P. and Camerer, C.F. [1996], "Loss-Avoidance and Forward Induction in Experimental Coordination Games," *Quarterly Journal of Economics,* 111, 165–194.

[9]The instructions for the practice exercise are as follows: "Please answer the following question: Imagine that you decide to rent and use machine 1. How much do you earn?" (A copy of the Instructions used in this study was provided by the authors).

[10]In their June 2011 version of the manuscript, referring to the second hypothesis, the authors state that "[t]hese predictions, if borne out, would replicate the results by Hossain and List" (Brooks et al. [2011], p. 10). Note first that Hossain and List's [2009] setting involves (monetary) payoff-maximizing behavior. Second, note that Hossain and List's [2009] findings regarding individual behavior do not suggest framing effects.

[11]Consider, for instance, strategic environments involving team production with complementarities. Landeo and Spier are currently conducting research on incentives and contract frames in these environments. Their study also addresses coordination problems in teams and focal point effects.

Holmstrom, B. [1982], "Moral Hazard in Teams," *Bell Journal of Economics* 13, 324–340.

– – [1979], "Moral Hazard and Observability," *Bell Journal of Economics* 10, 74–91.

Hossain, T. and List, J.A. [2009], "The Behavioralist Visits the Factory: Increasing Productivity using Simple Framing Manipulations," NBER Working Paper 15623.

Harrison, G.W. and List, J.A. [2004], "Field Experiments," *Journal of Economic Literature* 62, 1009–1055.

Landeo, C.M. and Spier, K.E. [2012], "Incentives and Contract Frames: Comment," *Journal of Institutional and Theoretical Economics* 168, 83–88. (DOI: http://dx.doi.org/10.1628/093245612799440005.)

Prendergast, C. [1999], "The Provision of Incentives in Firms," *Journal of Economic Literature* 37, 7–63.

Shavell, S. [1979], "Risk Sharing and Incentives in the Principal and Agent Relationship," *Bell Journal of Economics* 10, 55–73.

Tversky, A. and Kahneman, D. [1991], "Loss Aversion in Riskless Choice: A Reference-Dependent Model," *Quarterly Journal of Economics* 106, 1039–1061.